GAS DETECTION INSTRUMENT
DYNAMATION
COMBO 434
Q.C.

Combo Series

Combination Gas Detection Instrument No. 434 for Oxygen, Combustible and Toxic Gases

Combo 434 Gas Detection Instrument

Light Bar Display Improves Legibility Under All Conditions

For confined space use and areas where combustible, toxic gases and oxygen deficiency could be present, the Combo 434 gives a direct reading of gas levels with easy to read colored lights.

A multi-color light bar read out shows the level of gas with green/safe, yellow/caution and red/danger. If the levels exceed the alarm point an audible alarm sounds. The battery voltage is also displayed on a multi-color light bar and a low battery alarm sounds when its voltage is insufficient to operate the unit. After low battery warning the unit automatically shuts off. A fully charged Combo 434 provides more than 10 hours of continuous operation from its gell cell battery.

The 434 uses platinum beaded sensors for combustible gas and chemical sensors for oxygen and toxic. The toxic chemical cell is very selective to detecting only hydrogen sulfide and carbon monoxide. A dual marked scale shows the level of either hydrogen sulfide or carbon monoxide.

The sensor's compartment can be disconnected from the unit and with the remote cable detection is afforded up to 20 feet from the instrument.

Features

- **Displays combustible, oxygen and toxic gases simultaneously on easy to read multi-color light bars**
- **Sounds pulsating alarm when air is unsafe**
- **Simple operation and fast warmup**
- **10 hour continuous operation before recharging**
- **Low battery alarm and electronic circuit shut-off**
- **Built-in remote sensor capability**

Accessories

Calibration Kit includes gas valve, calibration connector and flow meter, No. 7800-011 50% LEL Methane gas cylinder and 7800-003 100 ppm Carbon Monoxide gas cylinder, screw driver and carrying case. Stk. No. 7720-001

Aspirator Attachment with manhole wand Stk. No. 7715-003

Remote Sensor Cable, 20 Ft. Stk. No. 7720-005

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Combo 434 Gas Detection Instrument

Specifications	Combustible	Toxic	Oxygen
Readout Range	0-40% LEL	0-40 ppm H_2S / 0-160 ppm CO	19-23%V
Preset Alarms (Field Adjustable)	10% LEL	10 ppm H_2S or 40 ppm CO	19.5%V Low / 22.5%V High
Sensor Type	Plat.Hot Wire Beaded	Chemical Cell	Chemical Cell
Response	90% in 5 seconds	90% in 30 sec.	90% in 30 sec.
Alarm Horn	Pulsating	Pulsating	Pulsating
Readout Display (in alarm)	RED	RED	RED
Accuracy	± 3% LEL	± 1 ppm	± 0.2%V
Warm Up	less than 3 sec.	less than 3 min.	less than 10 sec.
Temperature Range (Short Time Exp.)	0°-120°F −20°-130°F	32°-100°F 0°-120°F	0°-110°F −20°-120°F
Expected Life	2 years	1-2 years	1½-2 years
Sensor Life Warranty	1 year	1 year	1 year
Humidity	0-99° RH	Int. 0-99° RH Cont. 35-90% RH	0-99% RH

Originating Department

This practice was written by the Employee Safety Services staff, Telephone Operations Headquarters, Irving, Texas. Contact the Staff Manager – Standards & Practices regarding the content of this practice.

Disclaimer

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Overview

Scope

The requirements and procedures listed in this practice apply to all GTE Telephone Operations employees using the Dynamation Model Combo 434 Gas Monitor.

Use

The Combo 434 Gas Monitor:

- Provides continuous monitoring of the air.

  AND

- Warns users working in confined spaces (manholes, vaults, etc.) of hazardous levels of:

  - Combustible gas.
  - Toxic gas (H_2S and CO).
  - Oxygen (deficiency or enrichment).

This instrument is a life protection device which must not be used until:

- The operating instructions have been read and fully understood.

  AND

- Required calibrations and routine checks have been performed.

Acronyms and Definitions

The following acronyms are used in this practice.

ACRONYM	DEFINITION
CCW	Counterclockwise
CH_4	Methane
CO	Carbon monoxide
CW	Clockwise
H_2S	Hydrogen sulfide
LEL	Lower explosive limit
O_2	Oxygen
PPM	Parts per million
TP	Test point

 © Practice 603-020-102

Gases Monitored

The Combo 434 Gas Monitor is a portable, battery-powered gas monitor capable of:

- Detecting combustible, oxygen, and toxic gas levels.

  AND

- Displaying the concentrations on the light bar read-out in easily-understood warning colors.

IF THE WARNING COLOR IS...	IT INDICATES...
Red	Danger
Yellow	Caution
Green	Normal

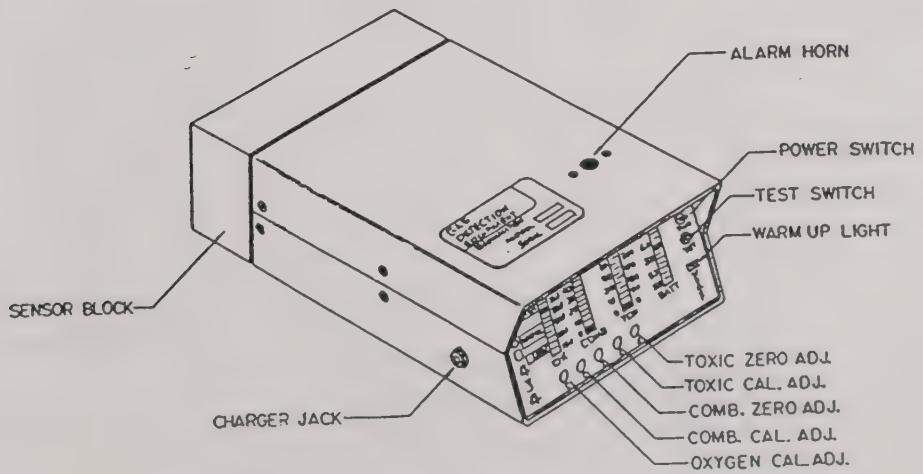
NOTE: The appropriate concentrations are printed adjacent to the light bar read-out.

The following gas concentrations are monitored:

- Toxic - H_2S and CO
- Combustible - essentially all combustibles (calibrated to methane)
- Oxygen - deficiency and enrichment (enrichment monitoring not included in older models of the 434 Gas Monitor)

Controls

The following illustration depicts the Combo 434 Gas Monitor.



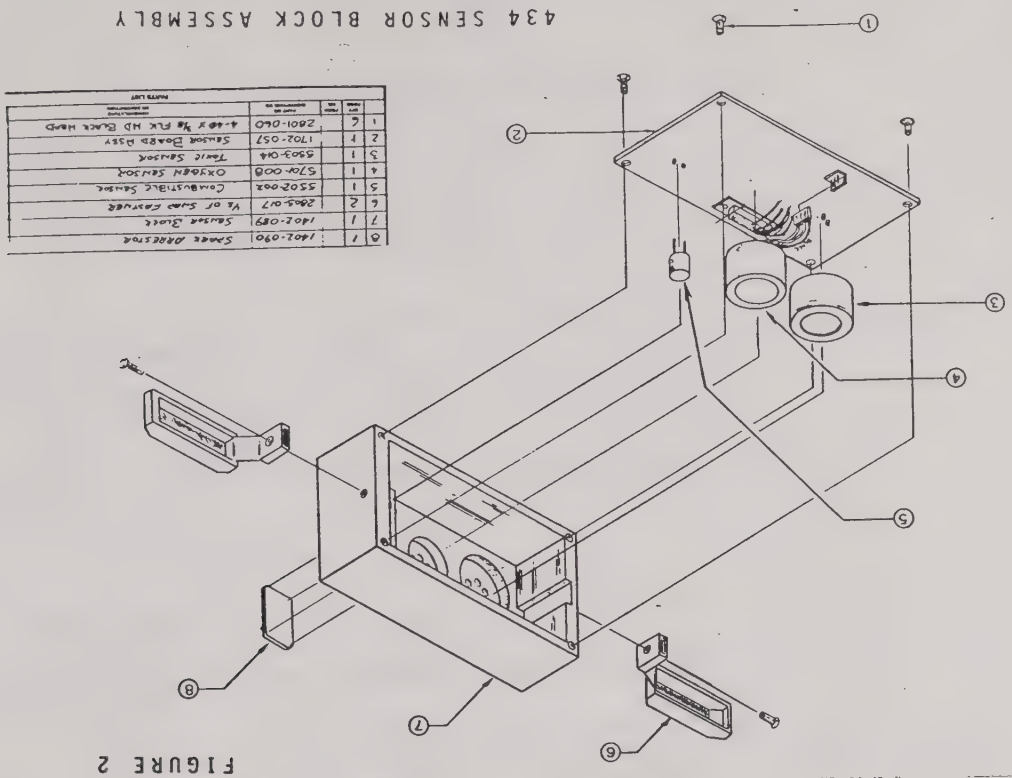
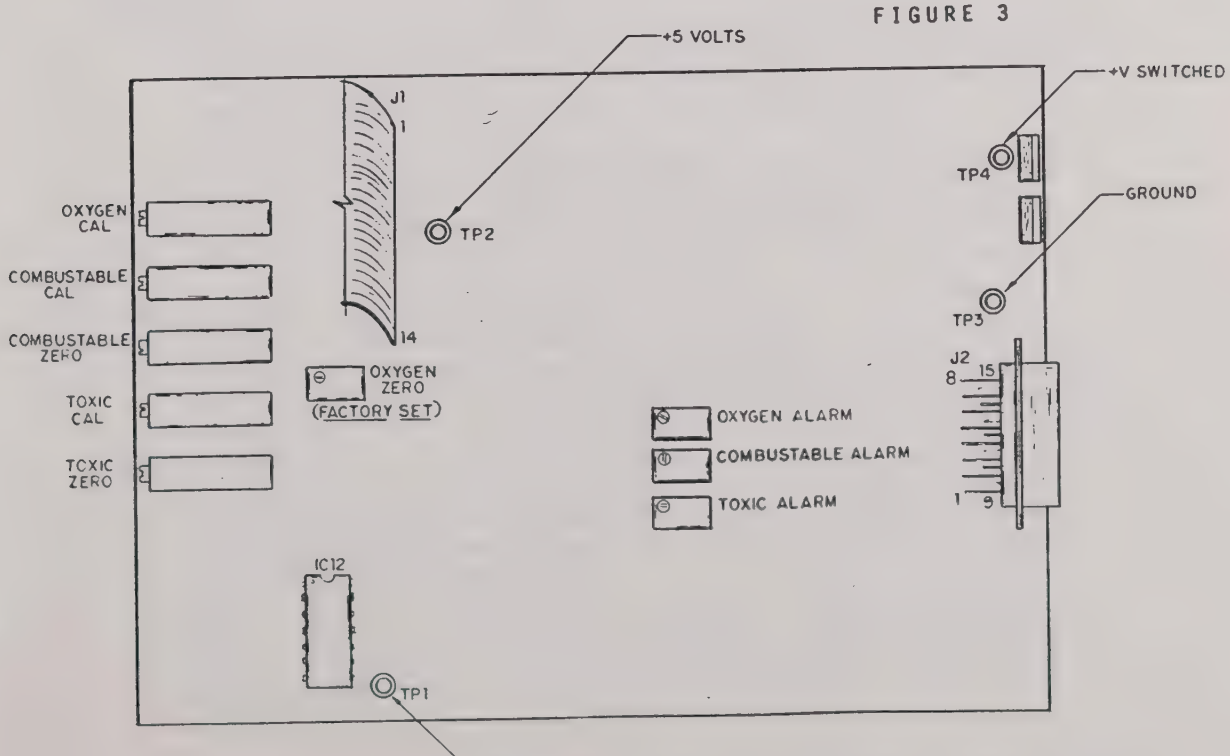


FIGURE 2

FIGURE 3



434 TEST POINTS & ADJUSTMENTS

Performance Check

Equipment Required:

19% Oxygen
20% LEL Methane
100 PPM Carbon Monoxide
— Gas

1. Perform a visual inspection of the case for any cracks or broken areas.
2. Check Battery date, replace if needed.
3. Check Battery for corrosion on contacts, replace if needed.
4. Discharge Batteries.
5. Charge Batteries overnight.
6. Check Model Number for the proper revision ie; 434A, 434B, 434C, 434D.
7. If unit is not a 434D refer to "Gas Monitor - Rework Model 434" section of this manual.
8. Turn unit on and allow the unit to warm up.
9. After the Warm Up LED extinguishes, set up unit as follows:
   a. If the face plate does not have a High, Normal, and Low reading, adjust the Oxygen Calibration Pot for a set reading of 21.0%, the Combustible Zero Pot for a reading of 0% LEL, and the Toxic Zero Pot for a reading of 0 PPM.
   b. If the face plate has the High, Normal, and Low readings, adjust the Oxygen Calibration Pot for 21.0%, The Combustible Zero Pot for one LED above 0% LEL, and the Toxic Zero Pot for a 0 PPM reading.
10. Check Alarm Points as follows:
    a. If face plate does not have the High, Normal, and Low readings for the Oxygen turn the Oxygen Calibration Pot on the front panel down until the first Red LED comes on. The alarm should be audible simultaneously.
    b. If the face plate has the High, Normal, and Low readings for the Oxygen Perform the above procedure and then turn the Oxygen Calibration Pot up to the first high Red Led comes on. The alarm should be audible simultaneously.
    c. Turn the Combustible Zero Pot up to the first Red LED. The alarm should be audible simultaneously.
    d. Turn the Toxic Zero Pot up to the first Red LED. The alarm should be audible simultaneously.

11. Reset the three Pots as described in step 9.

12. Apply the 100 PPM Carbon Monoxide Gas to unit.

13. After the unit has stabilized, it should read 100 PPM for a Toxic reading, if not adjust the Toxic Calibration Pot located under the cap.

14. Remove the gas and allow the unit to clear.

15. Apply the 19% Oxygen and 20% LEL Methane Gas.

16. After the unit has stabilized, it should read 20% LEL for a Combustible reading, if not adjust the Combustible Calibration Pot located under the cap. The oxygen reading should be 19%.

17. Remove the gas and let the unit clear.

NOTE: If any part of this procedure fails to meet specifications then repair and/or Calibration is necessary.

End Of Performance Check.

Calibration Procedure

Equipment Required:

19% Oxygen
20% LEL Methane
100 PPM Carbon Monoxide
— Gas

NOTE: THE FOLLOWING ADJUSTMENTS SHOULD NOT BE DONE UNLESS A MODIFICATION IS MADE. SEE A FACTORY TRAINED TECHNICIAN BEFORE PERFORMING THESE PROCEDURES...

1. Open unit and adjust the Toxic Zero pot on front panel so the first Red LED, 40 PPM, just comes on.

2. Adjust the Toxic Alarm Pot to just start to beep.

3. Adjust the Toxic Zero Pot up and down to be sure that the alarm comes on when the first red LED comes on.

4. Readjust the Toxic Zero Pot for 0 PPM.

5. Adjust the Combustible Zero Pot on the front panel so that the first Red LED, 10% LEL, just comes on.

6. Adjust the Combustible Alarm Pot so that the alarm just comes on.

7. Adjust the Combustible Zero Pot up and down so that the Alarm comes on when the first Red LED comes on in the combustible reading.

8. Readjust Combustible Zero Pot for a 0% LEL reading.

9. Adjust the Oxygen Calibration Pot so that the first Red LED, 20% Oxygen on the low end, just comes on.

10. Adjust the Low Oxygen Alarm Pot so that the alarm just starts to beep.

11. Adjust the Oxygen Calibration Pot up and down and make sure that the alarm comes on when the first Red LED comes on.

12. For units with a High Oxygen Alarm adjust the Oxygen Calibration Pot so that the first high Red LED, 23% oxygen, just comes on.

13. Adjust the High Oxygen Alarm Pot so that the alarm just starts to beep.

14. Adjust the Oxygen Calibration Pot up and down to make sure that the alarm comes on when the first high Red LED

comes on.

15. Readjust the Oxygen Calibration Pot for a reading of 20% oxygen.

NOTE: If any part of this procedure fails to meet specifications then repair is necessary.

End Of Calibration Procedure.
Perform a complete Performance Check.

Gas Monitor - Rework Model 434

Scope: The following procedure is established to rework and calibrate the Dynamation Model 434 gas monitors. This rework is required to comply with Title 29 Part 1910.1000 Code of federal regulations on permissible air contaminants.

Although the audio alarms can be readily adjusted on these instruments, it is necessary to revise the visual display colors to be consistent with the new standard.

In addition, this procedure includes changes to comply with a NIOSH proposed confined space requirement for combustible gas alarms.

Models Affected: Model 434D - no revision required
Model 434C with High Low O_2 Display - required as outlined.
Model 434A, B, or unmarked - revise LED's retain old display.

New Parts Required:
1. New Display - Part #7002-057
2. Red L.E.D. - Part #4802-013

Tools Required:
Phillips Screwdriver
Flat head Screwdriver
1/4" Nut Driver
20 Watt Soldering Iron
Braided Solder Wick (Solder Removal)
Roper Whiney Co. No. 5 IR Hand Punch

1. Remove sensor head from unit.
2. Remove 4 screws retaining 434 cover.
3. Disconnect horn connector and remove cover.
4. Remove battery disconnect connection.
5. Remove 2 phillips screws retaining head back on instrument that connects to battery bracket.
6. Remove 4 phillips screws that hold battery bracket and remove bracket.
7. Remove 2 flat head screws that retain display board.
8. Remove 2 retaining nuts on "test" and "on/off" switch.
9. Slide display out of display mount and remove charging jack nut and assembly.

10. Remove 1/4" nuts retaining circuit board. Nuts are located in front and rear corners (depending on production date read 1/4" nuts may not be in unit).

11. Remove circuit board, be careful not to lose fiber washers located under circuit board (one washer on front of unit per stud, two washers per stud on back of unit. Mylar is located between circuit board and display bracket).

12. Remove (desolder) two yellow LED's on combustible channel. Positions are 10 and 15 on combutible scale.

13. Replace (resolder) with two red LED's.

14. Remove faceplate from display mount. Faceplate uses double backed adhesive to hold in place.

15. Punch holes in faceplate accordinally (using old faceplate for hole realignment is recommended):

    A. 3/16" hole in two calibration access holes

    B. 7/32" hole in "on/off" and "test" switch

    C. 1/4" hole in zero adjust directly below gas display window

16. Reapply adhesive and apply new faceplate. **Be sure all holes line up correctly.**

17. Reassemble unit. Do not put cover on unit.

Alarm Adjustment

1. Combustible alarm

    A. Adjust "zero" control on front of instrument to light L.E.D. in the 10 LEL position.

    B. Adjust RV9 pot (located below battery) clockwise until unit alarms (be sure unit is not in warm-up).

2. Toxic alarm

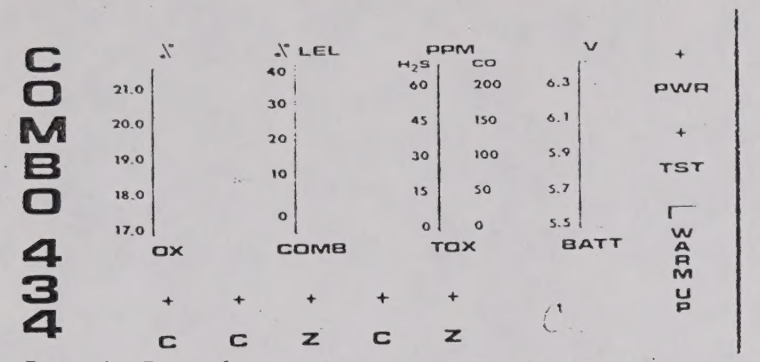
    A. Adjust "zero" control on front of instrument to light L.E.D. in the 40 PPM position.

    B. Adjust RV10 (below battery) clockwise until unit alarms.

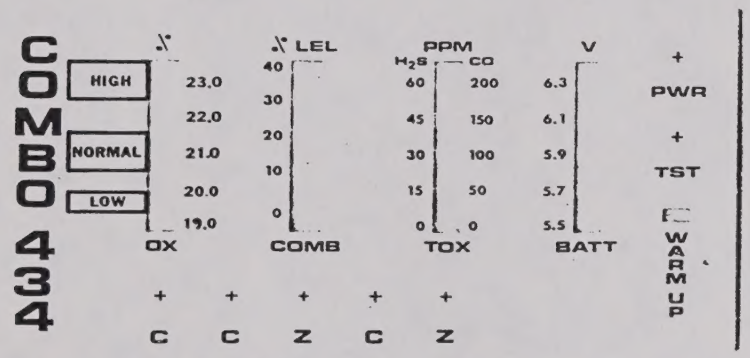
18. Put cover back on unit.

19. Allow unit to operate for approximately one half hour prior to initiating a final calibration sequence.

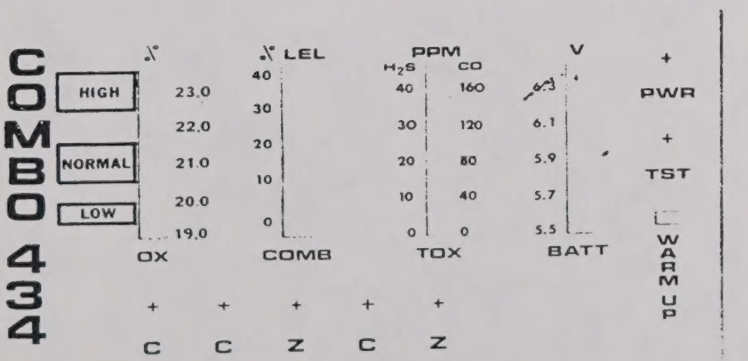
20. Recalibrate in standard procedure.



Rev. A, B, and some C cannot be updated to Rev. D under High/Low Oxygen, but Toxic can be adjusted to 35 PPM. Combustible can be adjusted to 10 LEL.



Rev."C"
Can be update to Rev."D"



Rev. "D"

ACCOPRESS®

25970	YELLOW
25971	BLACK
25972	LIGHT BLUE
25973	DARK BLUE
25974	LIGHT GRAY
25975	LIGHT GREEN
25976	DARK GREEN
25977	TANGERINE
25978	RED
25979	EXECUTIVE RED

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